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Anaemia During Pregnancy in Pakistan: An Underdeveloped Country's Perspective in COVID-19 Era

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ABSTRACT

Objective: To determine the frequency of gestational anaemia and compare hematological parameters among pregnant females in Pakistan's major ethnic groups, across four provinces.

Study Design: Prospective observational study.

Place and Duration of Study: Combined Military Hospital Karachi, Combined Military Hospital Kharian, Combined Military Hospital Mardan and Combined Military Hospital Quetta Pakistan, from Apr to Oct 2021.

Methodology: A total of 2099 pregnant females were included from four tertiary level hospitals in Pakistan. Their lab values were collected via an online proforma. Gestational anemia was defined according to World Health Organization definition. Descriptive statistics were applied to evaluate significant differences and associations between various hematological variables.

Results: Among 2099 patients, 119(53.0%) had mild to moderate anemia with Hb level more than 11g/dl, while 61(2.9%) suffered from severe anemia with Hb levels less than 8g/dl. Severe anaemia was most frequently reported from Punjab 130(25%), followed by KPK 15(2.9%) and Sindh 15(2.9%). Only 5(1%) mothers from Balochistan experienced severe anemia. Normocytic anaemia was the commonest form of anaemia found (mild to moderate anaemia group), whereas patients with severe anaemia had predominantly microcytic. The mean values of Mean Corpuscular Volume, ferritin, and Mean Corpuscular Hemoglobin Concentration differed significantly between the four locations with almost half of the anaemic study population residing in Punjab 245(21.9%) and 330(29.5%) in Sindh.

Conclusion: Gestational anaemia is widely reported from all provinces of Pakistan, where World Health Organization's definition of anemia may be potentially over-diagnosing gestational anaemia and may not be applicable in our part of the world.

Keywords: Anaemia, Gestational Anemia, Pregnancy, Pakistan.

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INTRODUCTION

Gestational anaemia is common complication associated with pregnancy, and it has become a global health issue especially in the underdeveloped world. World Health Organisation (WHO) statistics reveal that at least 30% of women develop gestational anaemia during their pregnancy,[1] ranging from 5.4% in developed countries to 80% in developing nations.[2-4] Several socio-demographic and economic characteristics of women also influence the distribution of gestational anaemia.[5] As different definitions of anaemia are used in different parts of the world, disparate prevalence and incidence ratios are often reported in literature, thus, the most frequently used definition is that of the WHO, where anemia in pregnancy is defined as haemoglobin (Hb) levels of 11g/dL in the first trimester, 10g/dL in the second and third trimesters, and 10g/L in the postpartum period".[6,7] Anaemia is unquestionably associated with suboptimal pregnancy outcomes,[8] with numerous adverse impacts on maternal and fetal health, linked to low Hb levels during pregnancy,[9] which results in lower haemoglobin levels and diminished oxygen-carrying and delivery capacity to the foetus, impairing fetal growth and development. As most of the previous literature mainly focused on association of iron deficiency with gestational anaemia, the impact of demographics and social economic conditions are often ignored.[10] Therefore, the aim of this study was to investigate the association of anaemia and other haematological parameters during pregnancy as the results could be of significance for the prevention and management of gestational anaemia, which would help to reduce adverse pregnancy outcomes.

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METHODOLOGY

This was a prospective observational study conducted in the following CMH: Karachi (Sindh), Quetta (Balochistan), Kharian (Punjab), and Mardan (KPK). The study was authorised by the PNS Shifa Ethics Committee (No. JS-1060). Sample size was calculated using WHO sample size calculator. With reported gestational anaemia prevalence from 20-50% in previous literature 1,21-22 and 95% confidence interval, the estimated population size was found to be 385. All participants provided informed consent. Nonprobability sampling was used for sample collection.

Inclusion Criteria: Pregnant women in all gestational ages, of all ages, were enrolled when they reported for routine antenatal checkups to Obstetrics OPD and were included in the study.

Exclusion Criteria: Women having a history of previous haematological disorders, such as lymphoma, leukaemia, polycythaemia, any recent blood transfusion, or any immune system problems, prior to or during pregnancy, were excluded.

All patients were followed up in the outpatient department, and anaemia was identified according to the WHO criteria (less than 11g/dl haemoglobin).[7,14] Statistical analysis was performed using Statistical Package for the Social Sciences (SPSS) version 25.0. Independent sample t-test was used to find the significant differences between the means and a *p*-value ≤0.05 was considered significant.

RESULTS

We enrolled 2099 pregnant women, 1119(53.0%) of whom were diagnosed with anaemia due to a Hb level of less than 11g/dl. The mean age was 28.04+4.93 years. Patients with Hb of 11g/dl and below had an average age of 29 years. Most women were aged 20-30 years 1395(67%). In terms of geographic distribution, 543(24%) women lived in Baluchistan, 543(26%) in KPK, 525(25%) in Sindh, and 530(25%) in Punjab. This provincial distribution is shown in Table-I.

Anaemia was found to occur most frequently in the lower socioeconomic group 779(37.11%), compared to only 45(2.1%) patients in the top socio-economic group.

Severe anaemia was most frequent in Punjab, with 25% of individuals having Hb <8g/dl, followed by KPK and Sindh, which had 15(2.9%) and 16(2.9%) cases of severe anaemia, respectively. Only 5(1%) mothers from Balochistan experienced severe anaemia. Normocytic anaemia was the most frequent anaemia in mildly anaemic patients, with 626(56%) patients having a normocytic picture, while 473(42%) individuals had microcytic anaemia, and only 20(1.8%) patients had macrocytic anaemia. Microcytic anaemia was the most frequent in the severe anaemia group, with 35(57%) patients and 16(26%) mothers had normocytic anaemia, while 10(16.4%) had macrocytic anaemia, as shown in Figure-1.

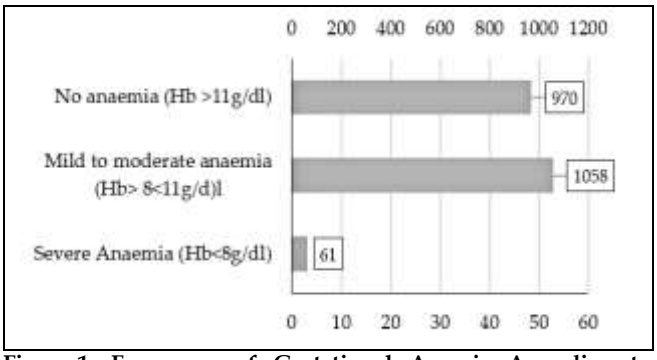

Figure-1: Frequency of Gestational Anemia According to Severity (n=2099)

DISCUSSION

Gestational anaemia is a common physiological occurrence associated with alterations in hematologic parameters throughout pregnancy,[11-13] however, the precise cause is unknown.[14]

While we utilised the WHO criteria for anaemia diagnosis (Hb 11g/dl),[15,16] it is believed that these definitions may not be applicable to underdeveloped countries as we found the frequency of gestational anaemia to be lower in Balochistan and KPK than in

Table-I: Province-wise Comparison of Haematological Parameters (n=2099)

Parameters	Balochistan (n=501)	KPK (n=543)	Punjab (n=520)	Sindh (n=525)	Significance
HB g/dl	10.94±1.062	10.93±1.362	10.8±1.870	10.30±1.477	<0.001
MCV FL	80.56±7.102	79.32±7.916	77.83±8.386	80.70±8.069	<0.001
MCHC g/dl	34.78±29.009	31.63±2.483	31.00±5.025	32.13±14.585	<0.001
TLC /mm3	8.23±1.963	8.77±2.098	8.25±2.290	9.92±2.397	<0.001
Platelet count (mcl)	278.48±76.016	281.32±69.203	298.10±85.832	271.89±78.422	0.535
Serum Ferritin ng/mL	16.00±12.623 (n=120)	23.06±15.214 (n=543)	23.76±19.254 (n=240)	20.24±18.013 (n=95)	<0.001

Punjab and Sindh. These findings cannot be compared to any local study as no study comparing maternal gestational haematological parameters across Pakistan's provinces has been published to date. Our findings were comparable to a study[17] which reported very high and fluctuating prevalence of anaemia in relation to geographical distribution, similar to another study, which found considerable disparities between regions.[18] Our findings, along with those from the aforementioned research, provide compelling evidence against the validity and universal applicability of the WHO criteria of gestational anaemia. Additional research on the involvement of indigenous guidelines and universally accepted classifications of gestational anaemia is required. Researchers from one study believed that sociodemographic conditions had a significant impact on maternal risk of anaemia development, however, their study only recorded Hb at term which was not the case in our study.[19] Unfortunately, in Pakistan, widespread non-gestational anaemia is also common, where one study reported anaemia in 4115(67.4%) males and 1018(64.5%) females.[20] Thus, anaemia during pregnancy may be a continuation of pre-existing anaemia in women, rather than a true gestational anaemia. BMI, abortion history, and prenatal comorbidities and access to medical facilities can affect the incidence of gestational anaemia[9,21] and may contribute to the development of a more accurate model but were not investigated in our study. Our study is the first in Pakistan to cast doubt on the commonly accepted WHO criteria of gestational anaemia and our data can serve as a foundation for future comparisons and research. Overall, as Pakistan is among the countries with very high prevalence of gestational anaemia, urgent measures are needed to prevent this health hazard.

LIMITATION OF STUDY

No long-term follow-up of patients was conducted and no data on maternal outcomes was collected due to limited resource availability. While four provinces of Pakistan were included, we omitted Azad Kashmir and Gilgit Baltistan, as these places are likely to possess unique dynamics due to their higher elevation as compared to the rest of Pakistan.

CONCLUSION

Our study established that gestational anaemia is common in all regions of Pakistan as WHO definition of anaemia may be potentially over-diagnosing gestational anaemia and may not be applicable to our part of the world. As a result, local policy reforms and disease definitions that are tailored to the demographic characteristics of Pakistani population must be done.

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Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

SNK & MIK: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

UA & AI: Conception, data analysis, drafting the manuscript, approval of the final version to be published.

MF & SZ: Data acquisition, critical review, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. Febr

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